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(54) Title: **TISSUE OXYGENATION MEASUREMENTS**

(57) Abstract: An effective contrast agent for use in MRI-based methods for directly determining tissue oxygenation in a subject using MRI equipment as well as methods for assessing tissue oxygenation were discovered. Methods employ a blood substitute bound to a water soluble polymer as an MRI contrast agent. In the experiments described herein, polyethylene glycol (PEG) derivatives of bovine hemoglobin (pegylated Hb or PEG-Hb) were used as the contrast agent.

WO 2005/097208 A3